

occurred over a section of country three or four miles wide by ten miles long during the night of the 9-10th, passing over the lake at Port Hope. Windows were broken and buildings otherwise injured, and crops greatly damaged.

Spokane Falls, Spokane county, Washington Territory, 10th: the severest hail storm ever known in this section occurred at 6 p. m. It lasted fifteen minutes, and hail one inch and a quarter in diameter fell to a depth of about two inches. Great damage resulted to vegetation; windows were broken and other damage done.

Duluth, Minnesota, 12th: between 5 and 6 p. m. several showers of hail fell, the hail-stones being about three-fourths inch in diameter, and fell in sufficient quantities to cover the ground.

Indianapolis, Indiana, 13th: during the thunder-storm on the afternoon of this date a heavy fall of hail, lasting from 6.30 to 6.25 p. m., occurred; the hail-stones were of a variety of irregular shapes, and some of them measured one inch in length by one-half inch in thickness.

Bloomington, McLean county, Illinois, 15th: the vicinity of Saybrook, in this county, was, on the 14th, visited by the severest hail storm known there for years. The storm lasted about fifteen minutes, covering the ground with hail-stones of an unusual size, many of which lay on the ground an hour after the storm abated; great damage was done to the crops.

Moorhead, Minnesota, 15th: during the thunder-storm which occurred at 8.58 p. m. heavy hail fell, lasting eight minutes, the hail-stones being from one-half to one inch in diameter and covering the ground in some places to a depth of two inches or more. Reports show that but little hail fell beyond the limits of this place and Fargo, Dakota. The principal damage done was to gardens, which were in most cases destroyed.

Fort Buford, Dakota, 15th: a thunder-storm, accompanied by a fall of very heavy hail, lasting only about thirty seconds, occurred about 7.30 p. m.

Fort Totten, Dakota, 15th: a very destructive hail storm is reported to have occurred in the vicinity of Niagara, Dakota, during the evening (about 11 p. m.). The path of the storm was about four miles wide and extended from Niagara to Reynolds. The damage to wheat is estimated at \$200,000.

Richardton, Dakota, 15th: a severe wind and hail storm struck Hebron, fourteen miles east of here, destroying houses and crops; at another place, six miles southeast of here, the storm caused total destruction of crops, and wrecked buildings.

Bristol, Sullivan county, Tennessee: a heavy hail storm passed about five miles northeast of this place during the evening of the 19th, doing much damage to crops, and totally ruining some fields of tobacco and corn.

Fort Buford, Dakota, 21st: a thunder-storm, accompanied by hail of very large size, occurred from 4.54 to 5.08 p. m. The hail-stones were as large as goose eggs, breaking all windows of northern exposure and causing considerable damage to the post garden.

Fort Totten, Dakota, 22d: a destructive hail storm occurred about fourteen miles south of this station during the afternoon of this date, causing damage estimated at \$22,000.

Huron, Dakota, 26th: heavy hail is reported to have fallen at points thirteen miles north of here, causing considerable damage to crops.

Fort Bennett, Dakota, 28th: reports from points south of this station state that a heavy rain and destructive hail storm occurred on this date.

La Crosse, Wisconsin, 29th: at 7.35 a. m. a heavy hail storm occurred, lasting fifteen minutes; the size of the hail-stones varied from that of hickory nuts to that of walnuts. Great damage was done to window-glass of southern exposure; the owner of an extensive hot-house within the city limits sustained a loss of \$500. As far as can be ascertained the hail storm covered an area of about ten square miles.

Fort Totten, Dakota, 29th: at 4.45 a. m. scattering hail-stones of large size fell with such force as to split shingles and break window-glass, etc. The hail-stones were from one to one and one-half inches in diameter; the large hail fell for only a

few minutes and was followed by a shower of smaller hail, which continued until 5 a. m. At Minnewaukon, Benson county, nearly all window-glass of northern exposure was broken; the storm travelled in a southeasterly direction and caused great damage to crops. It is reported that at points fifteen miles northward the hail-stones measured nine inches in circumference.

Saint Paul, Minnesota, 30th: a thunder-storm occurred during the afternoon, accompanied by a fall of hail from 6.28 to 6.40; the hail-stones varied in size from one-eighth to one inch in diameter and caused damage by breaking numerous windows in the city.

Other hail storms, of less violence and those of which no particulars were reported, occurred in the various states and territories as follows:

Alabama.—Greensborough, 18th.

Arizona.—San Carlos, 19th; Wilcox, 21st; Prescott, 22d.

Arkansas.—Lead Hill, 5th.

California.—Fort Bidwell, 20th.

Colorado.—Denver, 3d; Pike's Peak, 3d, 13th, 16th, 18th, 21st, 22d; Braddock, 26th, 30th.

Connecticut.—Hartford, 9th; Bethel, 29th.

Dakota.—Fort Yates, 3d, 22d, 23d; Deadwood, 4th; Wentworth, eight miles southeast of station on 4th, 22d; Fort Sully and Webster, 28th.

Idaho.—Cœur d'Alene, 10th.

Illinois.—Chicago, 4th.

Indiana.—Logansport, 13th; Jeffersonville, 30th.

Indian Territory.—Fort Reno, 5th.

Iowa.—West Union, 8th; Muscatine, 8th, 30th; Burlington, 13th; Oskaloosa, 23d; Fort Madison, 30th.

Kansas.—Allison, 4th; Sherlock, 13th; Wyandotte, 14th.

Kentucky.—Louisville, 30th.

Massachusetts.—Princeton, 29th.

Michigan.—Fort Huron, 13th.

Minnesota.—Duluth, 8th; Saint Vincent, 11th; Rochester, 12th; Northfield, 16th, 29th; Moorhead, 18th, 29th.

Montana.—Fort Benton, 16th, 19th.

Nebraska.—Crete, 4th.

New Jersey.—Little Egg Harbor, 2d; Dover, 5th, 29th.

New Mexico.—Lava, 2d; Fort Union, 3d, 4th.

New York.—Oswego, 13th; New York City, 25th.

Ohio.—Hiram and Garrettsville, 9th.

Oregon.—Fort Klamath, 27th.

Texas.—Fort Concho, southeast of station, 5th.

Utah.—Frisco, 15th; Salt Lake City, 24th.

Vermont.—Post Mills, 9th.

Wisconsin.—Madison, 8th, 29th; La Crosse, 8th, 30th.

Wyoming.—Fort Bridger, 1st.

COTTON REGION REPORTS.

The following table shows the means of the maximum and minimum temperatures, and the average rainfall for the several cotton districts, for the month of July, 1885, together with the averages for the same districts for July of the three preceding years:

Temperature and rainfall data for the cotton districts, July, 1885.

Districts.	Rainfall.			Temperature.							
	Average for July of three preceding years.	Average for July, 1885.	Departures.	Maximum.				Minimum.			
				Mean for July of three preceding years.	Mean for July, 1885.	Departures.	Mean for July of three preceding years.	Mean for July, 1885.	Departures.	Extremes for July, 1885.	
										Max.	Min.
New Orleans...	4.41	3.80	— 0.61	93.0	94.2	+ 1.2	73.6	73.7	+ 0.1	105	64
Savannah.....	5.00	5.47	+ 0.47	92.8	93.0	+ 0.2	71.7	72.2	+ 0.5	103	58
Charleston.....	6.28	6.85	+ 0.57	92.4	91.0	— 1.4	70.7	70.2	— 0.5	101	51
Atlanta.....	3.69	3.99	+ 0.30	90.4	91.3	+ 0.9	68.7	69.0	+ 0.3	102	46
Wilmington.....	4.69	4.35	— 0.34	91.1	90.9	— 0.2	68.9	68.3	— 0.6	102	40
Memphis.....	4.77	2.88	— 1.89	89.9	91.5	+ 1.6	68.2	70.4	+ 2.2	106	50
Galveston.....	2.04	2.58	+ 0.54	95.2	94.0	— 1.2	73.0	70.9	— 2.1	105	51
Vicksburg.....	5.88	4.89	— 0.99	91.9	93.1	+ 1.2	71.6	69.7	— 1.9	99	47
Montgomery.....	4.71	4.54	— 0.17	92.0	92.2	+ 0.2	68.7	70.0	+ 1.3	105	50
Augusta.....	3.51	3.71	+ 0.20	92.3	93.7	+ 1.4	70.6	69.8	— 0.8	104	53
Little Rock.....	2.75	1.95	— 0.80	92.7	94.0	+ 1.3	67.1	70.4	+ 3.3	105	53
Mobile.....	3.52	4.92	+ 1.40	93.9	93.9	— 0.1	70.6	71.1	+ 0.5	106	55

The rainfall, as compared with the average for July of the past three years, has been deficient in the New Orleans, Memphis, Vicksburg, Little Rock, and Mobile districts; in all other districts there has been an excess. The means of the maximum and minimum temperatures for the several districts have generally been above the average.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for July, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	80.2	65.2	15.0	4.8	73.3
Alpena, Michigan	74.0	65.5	8.5	12.8	64.7
Augusta, Georgia	84.0	76.1	7.9	6.2	80.7
Baltimore, Maryland	83.4	72.5	10.9	10.3	79.6
Block Island, Rhode Island	71.0	60.2	10.8	6.0	70.6
Boston, Massachusetts	70.1	56.3	13.8	20.4	71.3
Buffalo, New York	68.8	61.1	7.7	9.2	69.5
Canby, Fort, Washington Territory	68.8	62.0	6.8	15.0	60.4
Cedar Keys, Florida	89.3	81.3	8.0	8.3	82.1
Charleston, South Carolina	85.4	79.6	5.8	41.5	81.9
Chicago, Illinois	66.1	59.3	6.8	8.0	72.8
Chincoteague, Virginia	88.0	67.1	20.9	3.0	70.4
Cleveland, Ohio	77.3	67.6	9.7	14.0	71.6
Detroit, Michigan	75.2	72.0	3.2	24.5	74.7
Duluth, Minnesota	67.7	48.7	19.0	10.1	65.5
Eastport, Maine	49.0	43.4	5.6	15.2	61.6
Escanaba, Michigan	72.8	61.7	11.1	18.1	67.6
Galveston, Texas	88.5	85.0	3.5	12.8	84.9
Grand Haven, Michigan	77.9	53.4	24.5	19.0	67.3
Indianola, Texas	88.6	84.5	4.1	8.7	83.0
Jacksonville, Florida	88.9	87.9	1.0	18.0	82.4
Key West, Florida	89.0	86.7	2.3	17.6	84.9
Mackinaw City, Michigan	71.6	59.3	12.3	10.0	65.3
Macon, Fort, North Carolina	87.0	77.0	10.0	7.7	79.8
Marquette, Michigan	66.0	50.6	15.4	8.0	68.4
Milwaukee, Wisconsin	87.0	80.7	6.3	16.0	79.7
Mobile, Alabama	86.2	63.9	22.3	17.2	72.1
New Haven, Connecticut	69.2	58.3	10.9	12.3	71.4
New London, Connecticut	77.8	65.0	12.8	13.8	70.2
Norfolk, Virginia	86.7	74.0	12.7	10.3	81.5
Pensacola, Florida	85.9	81.4	4.5	17.3	81.6
Portland, Maine	64.1	53.1	11.0	16.9	67.6
Portland, Oregon	73.9	69.7	4.2	57.3	68.0
Sandusky, Ohio	81.4	69.8	11.6	11.9	74.5
Sandy Hook, New Jersey	74.8	64.0	10.8	2.3	73.7
San Francisco, California	63.1	58.1	5.0	36.2	60.5
Savannah, Georgia	86.8	81.8	5.0	9.8	82.5
Smithville, North Carolina	86.5	79.8	6.7	10.8	80.6
Toledo, Ohio	82.1	71.2	10.9	13.4	75.3
Wilmington, North Carolina					

• Record for first 17 days of month.

† Record for 10 days.

WINDS.

The most frequent directions of the wind during July, 1885, are shown on chart ii. by arrows flying with the wind; with the exception of a few stations, the prevailing winds in all districts east of the one hundredth meridian, were from the south or southwest; on the Pacific coast they were westerly; in the Rocky mountain districts they were variable.

HIGH WINDS.

(In miles per hour.)

On the summit of Mount Washington, New Hampshire, winds of fifty or more miles per hour occurred during the month as follows: 60, nw., 8th; 90 nw., 9th; 65, nw., 10th; 58, nw., 11th; 60, se., 14th; 56, nw., 15th; 96, nw., 17th; 83, w., 18th; 60, nw., 20th; 60, w., 21st; 60, nw., 22d; 54, sw., 24th; 61, nw., 25th; 60, nw., 26th.

Other stations reporting wind velocities of fifty miles or more per hour are as follows:

Pike's Peak, Colorado, 56, w., 5th; 52, w., 15th.

Fort Buford, Dakota, 50, w., 6th.

Poplar River, Montana, 60, n., 16th.

Fort Totten, Dakota, 53, ne., 28th.

Moorhead, Minnesota, 51, n., 29th.

LOCAL STORMS AND TORNADES.

The "New York Herald," of July 3d, contained the following:

NEW ORLEANS, July 2, 1885.—A special dispatch from Santa Rosa, Mexico, gives an account of a cyclone which passed over that section recently, doing great damage. Colonel Pedro Valdez had his out-houses blown down, and estimates his loss by breaking off and uprooting of sugar cane at several thousand dollars. Where the storm crossed the Sabine river great cottonwood and pine trees were snapped off at the roots or torn up bodily. After the storm had passed the stumps of trees looked like gigantic grass over which a mower had passed. Not a tree was left standing in its course. In San Juan del Sabinas forty houses were blown down and several persons injured. Ranches in the track of the storm were much damaged and many cattle and sheep killed. The track of the storm was four hundred yards wide and its duration from four to five minutes.

White House, Hunterdon county, New Jersey: a very heavy rain storm occurred in this vicinity at about 3 p. m. on the 6th. Rockaway creek rose to a greater height than has been known for many years; several bridges were washed away; much damage was done to crops.

Chattanooga, Tennessee: a severe wind storm is reported to have occurred during the night of the 6-7th in the vicinity of Glenn Station, Alabama, on the Memphis and Charleston railroad. A freight car was blown from the side-track at that place.

Ithaca, Tompkins county, New York: a tornado occurred at 11.30 a. m. on the 7th, passing through the village of Varua, two miles east of Ithaca. The damage to buildings was confined to sheds and other light structures.

Green Bay, Brown county, Wisconsin: a severe storm occurred here between 6 and 7 p. m. on the 8th. The most violent part of the storm was of about thirty minutes duration. Several buildings were damaged by lightning.

Sparta, Monroe county, Wisconsin: a violent storm occurred at this place during the evening of the 8th. Numerous buildings were badly damaged; fourteen cars at the Saint Paul depot were blown from the track; several cars at the North-western depot were also derailed.

Edgerton, Rock county, Wisconsin: more than two hundred tobacco sheds in this vicinity were demolished by the storm on the 8th; dwellings, barns, and other out-buildings were also damaged, and considerable live stock was killed.

At Appleton, Outagamie county, Wisconsin: a church, mill, and a number of residences were destroyed by the storm of the 8th; at Stoughton, Dane county, dwellings, barns, and tobacco sheds were also destroyed, and a number of horses and cattle were killed.

West Salem, La Crosse county, Wisconsin: the storm of the 8th was one of the most severe experienced in this vicinity for many years. Its course, in a narrow path, was from a point about three miles northwest of this place, directly eastward. The appearance of the forest indicates that there were two currents, one from the southwest and the other from the northwest. In one instance, of a fine orchard of fifty trees, about a dozen remained standing, the others having been broken off or torn out of the ground. In Lewis Valley there was a heavy fall of hail, which did great damage to the grain crops.

Cashton, Monroe county, Wisconsin: at about 7 p. m. on the 8th two storms, one coming from the southwest and the other from the northwest, met near the town of Clinton, Vernon county, forming a tornado which moved in an easterly direction, destroying much property in its course.

Neillsville, Clark county, Wisconsin: a severe storm occurred here at about 5.30 p. m. on the 8th; much damage was done to buildings, trees, etc.

Plainfield, Waushara county, Wisconsin: the storm of the 8th was one of the most violent that has ever occurred here. A large number of buildings were blown down or unroofed.

Port Edwards, Wood county, Wisconsin: a store, mill, and five dwellings at this place were destroyed by the storm of the 8th. At Dexterville, in this county, the damage by wind and lightning is estimated at \$5,000.

Waupaca, Waupaca county, Wisconsin: a destructive storm